

A Review of Amino Acids



This brief tutorial covers the chemical and structural properties of the 20 Amino Acids commonly found in proteins.

The tutorial contains a number of graphic images, it may take a while to download, so please be patient. After reviewing the amino acids, try out the [Interactive Quiz](#). ☺

Note: The quiz requires a browser that recognises Frames and JavaScript, for example - Netscape Navigator 2.0 or above.

Amino Acid Properties

Amino acids are the basic structural units of proteins. An alpha-amino acid consists of an amino group, a carboxyl group, a hydrogen atom, and a distinctive R group bonded to a carbon atom, which is called the alpha-carbon because it is adjacent to the carboxyl (acidic) group. An R group is referred to as a *side chain*. (Stryer, 1988)

Amino Acids are commonly classified into the following groups based on the chemical and/or structural properties of their *side chains* :

- Aliphatic Amino Acids
- A Cyclic Amino Acid
- AAs with Hydroxyl or Sulfur-containing side chains
- Aromatic Amino Acids
- Basic Amino Acids
- Acidic Amino Acids and their Amides

Amino Acid Structures

To view the amino acid structures using [Rasmol](#) click on the appropriate amino acid images below. A script is available ([aacolors](#)) to color the molecules as per the image.





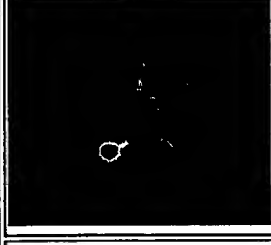

When you are finished viewing the amino acid, type
zap (enter)







in the command line window to close the current molecule before selecting another amino acid for



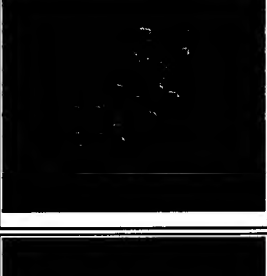

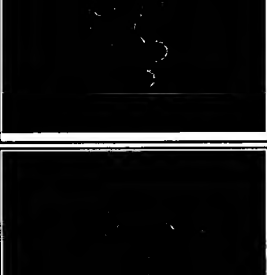
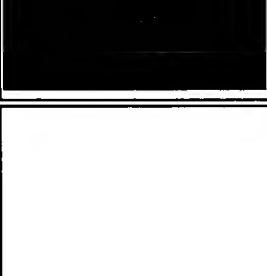
viewing. Quit the Rasmol application by typing

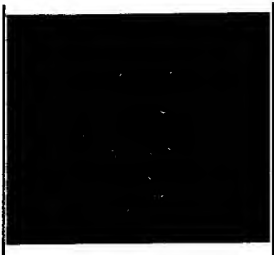
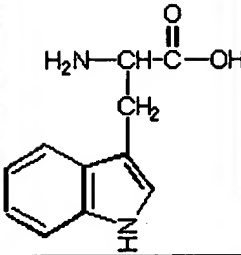

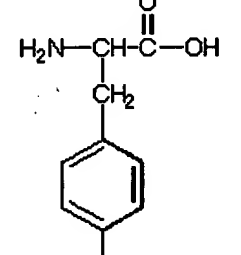

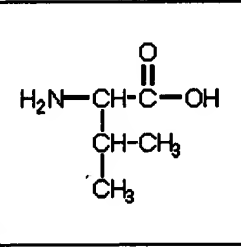
exit (enter)

in the command line window. Consult the online [Rasmol Manual](#) if you need further help using Rasmol.

Rasmol Image	Amino Acid	3-letter code	1-letter code	Properties	Structure (un-ionised form)
	Alanine	Ala	A	aliphatic hydrophobic neutral	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_3 \end{array}$
	Arginine	Arg	R	polar hydrophilic charged (+)	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{NH} \\ \\ \text{C}=\text{NH} \\ \\ \text{NH}_2 \end{array}$
	Asparagine	Asn	N	polar hydrophilic neutral	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{C}=\text{O} \\ \\ \text{NH}_2 \end{array}$
	Aspartate	Asp	D	polar hydrophilic charged (-)	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{C}=\text{O} \\ \\ \text{OH} \end{array}$
	Cysteine	Cys	C	polar hydrophobic neutral	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{SH} \end{array}$
	Glutamine	Gln	Q	polar hydrophilic neutral	

					$ \begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{C}=\text{O} \\ \\ \text{NH}_2 \end{array} $
	Glutamate	Glu	E	polar hydrophilic charged (-)	$ \begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{C}=\text{O} \\ \\ \text{OH} \end{array} $
	Glycine	Gly	G	aliphatic neutral	$ \begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{H} \end{array} $
	Histidine	His	H	aromatic polar hydrophilic charged (+)	$ \begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{C}_5\text{H}_4\text{N} \end{array} $
	Isoleucine	Ile	I	aliphatic hydrophobic neutral	$ \begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}-\text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \end{array} $
	Leucine	Leu	L	aliphatic hydrophobic neutral	$ \begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{CH}-\text{CH}_3 \\ \\ \text{CH}_3 \end{array} $
	Lysine	Lys	K	polar hydrophilic charged (+)	

					$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{C}(=\text{O})-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{NH}_2 \end{array}$
	Methionine	Met	M	hydrophobic neutral	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{C}(=\text{O})-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{S} \\ \\ \text{CH}_3 \end{array}$
	Phenylalanine	Phe	F	aromatic hydrophobic neutral	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{C}(=\text{O})-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{C}_6\text{H}_5 \end{array}$
	Proline	Pro	P	hydrophobic neutral	$\begin{array}{c} \text{O} \\ \\ \text{C}-\text{OH} \\ \\ \text{HN} \end{array}$
	Serine	Ser	S	polar hydrophilic neutral	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{C}(=\text{O})-\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{OH} \end{array}$
	Threonine	Thr	T	polar hydrophilic neutral	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{C}(=\text{O})-\text{OH} \\ \\ \text{CH}-\text{OH} \\ \\ \text{CH}_3 \end{array}$
	Tryptophan	Trp	W	aromatic hydrophobic neutral	

					
	Tyrosine	Tyr	Y	aromatic polar hydrophobic	
	Valine	Val	V	aliphatic hydrophobic neutral	

[Home](#)[Lectures](#)[Tutorials](#)[Gallery](#)[Topics](#)[Help](#)